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Stephan W. Wegerich

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EXAMINER

DOUGHERTY, ANTHONY T

ART UNIT

PAPER NUMBER

2863

DATE MAILED: 11/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/800,977

Applicant(s)

WEGERICH, STEPHAN W.

Examiner

Anthony T. Dougherty

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,6-13,19-22 and 29-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19-22 and 29-34 is/are allowed.
- 6) ☒ Claim(s) 1-3,6-13 and 35-46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 12.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 6-9, 11, 13, 35-38, 40, 41, 43, 45, and 46 rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,539,343 to Zhao et al.

With regard to claim 1, Zhao et al. discloses a system for extracting information from a complex signal (see abstract), with a decomposition module to derive a snapshot of input signal components from the complex signal (see column 3 line 29 through line 42), it is inherent to Zhao et al. that a memory is used for storing reference snapshots – it is inherent because the disclosure speaks of collecting training data and constructing signal templates which cannot be done within a processing system as described without a memory for storing the data (see column 4 line 10 through line 29), the reference snapshots characterizing recognized states of the complex signal (see column 3 line 42 through line 44), and comparing input signal components against reference snapshots to provide a similarity measure as a function of elemental similarity values between corresponding components of the input snapshot and the reference snapshot, (see column 5 line 11 through line 12), according to a mapping into an expected range for a component (see column

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5 line 23 through line 30), which provides information about the state of the complex signal (see column 5 line 4 through line 12).

With regard to claim 2 and applying the rejection of claim 1 above, Zhao et al. discloses using wavelet analysis to decompose the complex signal into a plurality of component coefficients (see column 3 line 45 through line 47).

With regard to claim 6 and applying the rejection of claim 1 above, Zhao et al. discloses the complex signal is a communication signal (see column 4 line 10 through line 18), the system having a lookup table (see column 4 line 1 through line 9), matching a snapshot with a reference snapshot in memory based on at least one similarity measure (see column 5 line 4 through line 12), matching reference snapshot identifying an entry in the lookup table (see column 4 line 1 through line 9), and the identified lookup table entry being presented as an output of the system (see column 4 line 10 through line 18).

With regard to claim 7 and applying the rejection of claim 1 above, Zhao et al. discloses combining an expected value and a corresponding signal to determine a residual value (see column 5 line 58 through line 60), and a test unit for determining a deviation based on the residual (see column 5 line 61 through line 62).

With regard to claim 8 and applying the rejection of claim 7 above, Zhao et al. discloses a diagnostic unit responsive to deviations from a test unit for generating a diagnosis of a condition in the operation of the monitored system (see column 5 line 62 through line 65).

With regard to claim 9 and applying the rejection of claim 7 above, Zhao et al. discloses the test unit applies a threshold to the residual to determine a deviation (see column 5 line 23 through line 30 & column 5 line 63 through line 65).

With regard to claim 11, Zhao et al. discloses monitoring the operating condition of a system (see abstract) by a sensor means for acquiring a time-varying signal characterizing operation of the system (see column 3 line 29 through line 44), means for decomposing the time-varying signal into a plurality of components (see column 3 line 45 through line 67), it is inherent to Zhao et al. that a memory is used for storing reference snapshots – it is inherent because the disclosure speaks of collecting training data and constructing signal templates which cannot be done within a processing system as described without a memory for storing the data (see column 4 line 10 through line 29), the reference snapshots characterizing recognized states of the complex signal (see column 3 line 42 through line 44), it is inherent to Zhao et al. that a processor means is used – it is inherent because the disclosure speaks of comparisons and analysis that can only be accomplished in the processing system described by the use of a processing means (see column 4 line 1 through line 29), the processing means generating estimates of components using a similarity operation on the component values from the decomposing means with reference to component values in each reference snapshot in memory

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(see column 5 line 4 through line 12), generating residual values by differencing component values and estimates (see column 5 line 58 through line 60), for determining deviating operating conditions of the system (see column 5 line 62 through line 65).

With regard to claim 13 and applying the rejection of claim 11 above, Zhao et al. discloses generating estimates by comparison within an expected range (see column 5 line 23 through line 30).

With regard to claim 35, and applying the rejection of claim 11 above, Zhao et al. discloses the sensor means measures vibration of the system (see column 3 line 38).

With regard to claim 36, and applying the rejection of claim 11 above, Zhao et al. discloses the sensor means measures acoustic energy given off of the system (see column 3 line 39).

With regard to claim 37, and applying the rejection of claim 11 above, Zhao et al. discloses the sensor means measures electric current used in the system (see column 3 line 39).

With regard to claim 38, and applying the rejection of claim 11 above, Zhao et al. discloses the processor means determines whether a residual value exceeds a threshold from determining deviating operating conditions of the system (see column 5 line 61-65).

With regard to claim 40 Zhao et al. discloses a method for monitoring the operating condition of a system (see abstract) by acquiring a time-varying signal characterizing operation of the system (see column 3 line 29-47), periodically extracting observations of features from the time-varying signal (see column 4 line 44-47), generating estimates for at least one of the extracted features responsive to extracting an observation of features (see column 4 line 64-65), using a similarity operation with reference to a stored library of feature observations characteristic of acceptable operation of the system (see column 5 line 23-30), differencing at least one of the feature estimates with the extracted features to produce residuals for determination of deviating operating conditions of the system (see column 5 line 58-65).

With regard to claim 41, and applying the rejection of claim 40 above, Zhao et al. discloses determining whether at least one of the residuals exceeds a threshold (see column 5 line 61-65).

With regard to claim 43, and applying the rejection of claim 40 above, Zhao et al. discloses the estimate generating step uses a similarity operation that normalizes a comparison of corresponding values of a feature from two feature observations with an expected range of variation for that feature (see column 3 line 45 through column 4 line 9).

With regard to claim 45, and applying the rejection of claim 40 above, Zhao et al. discloses the step of extracting features includes determining wavelet coefficients for the time-varying signal (see column 4 line 44-47).

With regard to claim 46, and applying the rejection of claim 40 above, Zhao et al. discloses providing the library of feature observations by selecting from previously acquired feature data of the system those observations wherein a feature value represents either the largest or smallest value for that feature across the previously acquired feature data (see column 4 line 56-65).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 3 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,539,343 to Zhao et al. in view of U.S. Patent No. 5,526,446 to Adelson et al.

With regard to claim 3 the primary reference to Zhao et al. discloses a system for extracting information from a complex signal (see abstract), with a decomposition module to derive a snapshot of input signal components from the complex signal (see column 3 line 29 through line 42), it is inherent to Zhao et al. that a memory is used for storing reference snapshots – it is inherent because the disclosure speaks of collecting training data and constructing signal templates which cannot be done within a processing system as described

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without a memory for storing the data (see column 4 line 10 through line 29), the reference snapshots characterizing recognized states of the complex signal (see column 3 line 42 through line 44), and comparing input signal components against reference snapshots to provide a similarity measure as a function of elemental similarity values between corresponding components of the input snapshot and the reference snapshot, (see column 5 line 11 through line 12), according to a mapping into an expected range for a component (see column 5 line 23 through line 30), which provides information about the state of the complex signal (see column 5 line 4 through line 12). However, Zhao et al. fails to disclose decomposing a signal based on frequency filters.

The secondary reference to Adelson et al. discloses frequency filters used to decompose a signal (see column 2 line 12 through line 27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have specified the invention of Zhao et al. use frequency filters to decompose a signal.

Accordingly, such a modification would have been obvious since Adelson et al. teaches decomposing a signal by frequency filters allows one to distinguish noise from signal information and thus obtain a more accurate measurement of the signal than one with noise included in the measurement (see column 2 line 19 through line 22), thereby suggesting the obviousness of the modification.

5. Claims 10, 12, 42, and 44 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,539,343 to Zhao et al. in view of U.S. Patent No. 5,459,675 to Gross et al.

With regard to claim 10 the primary reference to Zhao et al. discloses a system for extracting information from a complex signal (see abstract), with a decomposition module to derive a snapshot of input signal components from the complex signal (see column 3 line 29 through line 42), it is inherent to Zhao et al. that a memory is used for storing reference snapshots – it is inherent because the disclosure speaks of collecting training data and constructing signal templates which cannot be done within a processing system as described without a memory for storing the data (see column 4 line 10 through line 29), the reference snapshots characterizing recognized states of the complex signal (see column 3 line 42 through line 44), and comparing input signal components against reference snapshots to provide a similarity measure as a function of elemental similarity values between corresponding components of the input snapshot and the reference snapshot, (see column 5 line 11 through line 12), according to a mapping into an expected range for a component (see column 5 line 23 through line 30), which provides information about the state of the complex signal (see column 5 line 4 through line 12), and combining an expected value and a corresponding signal to determine a residual value (see column 5 line 58 through line 60), and a test unit for determining a deviation based on the residual (see column 5 line 61 through line 62). However, Zhao et al. fails to disclose applying a sequential probability ratio test to a sequence of values of a residual to determine a deviation.

The secondary reference to Gross et al. discloses applying a sequential probability ratio test to a sequence of values of a residual to determine a deviation (see last four line of abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have specified Zhao et al. use a sequential probability ratio test of values of a residual to determine a deviation.

Accordingly, such a modification would have been obvious since Gross et al. teaches that a sequential probability ratio allows for early annunciation of the onset of a disturbance in noisy process variables and has user specifiable alarms and missed alarm probabilities (see column 1 line 29 through line 36) allowing for a more accurate system with respect to alarm frequency and validity, thereby suggesting the obviousness of the modification.

With regard to claim 12 the primary reference to Zhao et al. discloses monitoring the operating condition of a system (see abstract) by a sensor means for acquiring a time-varying signal characterizing operation of the system (see column 3 line 29 through line 44), means for decomposing the time-varying signal into a plurality of components (see column 3 line 45 through line 67), it is inherent to Zhao et al. that a memory is used for storing reference snapshots – it is inherent because the disclosure speaks of collecting training data and constructing signal templates which cannot be done within a processing system as described without a memory for storing the data (see column 4 line 10 through line 29), the reference snapshots characterizing recognized states of the complex signal (see column 3 line 42 through line 44), it is inherent to Zhao et al. that a processor means is used – it is inherent because the disclosure speaks of comparisons and analysis that can only be accomplished in the processing system described by the use of a processing means (see column 4 line 1 through line 29), the processing means generating estimates of components using a similarity operation on the

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component values from the decomposing means with reference to component values in each reference snapshot in memory (see column 5 line 4 through line 12), generating residual values by differencing component values and estimates (see column 5 line 58 through line 60), for determining deviating operating conditions of the system (see column 5 line 62 through line 65). However, Zhao et al. fails to disclose applying a sequential probability ratio test to a sequence of values of a residual to determine a deviation.

The secondary reference to Gross et al. discloses applying a sequential probability ratio test to a sequence of values of a residual to determine a deviation (see last four line of abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have specified Zhao et al. use a sequential probability ratio test of values of a residual to determine a deviation.

Accordingly, such a modification would have been obvious since Gross et al. teaches that a sequential probability ratio allows for early annunciation of the onset of a disturbance in noisy process variables and has user specifiable alarms and missed alarm probabilities (see column 1 line 29 through line 36) allowing for a more accurate system with respect to alarm frequency and validity, thereby suggesting the obviousness of the modification.

With regard to claim 42 the primary reference to Zhao et al. discloses a method for monitoring the operating condition of a system (see abstract) by acquiring a time-varying signal characterizing operation of the system (see column 3 line 29-47), periodically extracting observations of features from the time-varying signal (see column 4 line 44-47), generating estimates for at least one of the extracted features responsive to extracting an observation of

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features (see column 4 line 64-65), using a similarity operation with reference to a stored library of feature observations characteristic of acceptable operation of the system (see column 5 line 23-30), differencing at least one of the feature estimates with the extracted features to produce residuals for determination of deviating operating conditions of the system (see column 5 line 58-65). However, Zhao et al. fails to disclose performing a sequential probability ratio test on one the residuals.

The secondary reference to Gross et al. discloses performing a sequential probability ratio test on residuals used to identify a data pattern indicative of an operating state of a system (see claim 19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have specified Zhao et al. use a sequential probability ratio test on residuals to determine a data pattern indicative of an operating state of a system.

Accordingly, such a modification would have been obvious since Gross et al. teaches a sequential probability ratio test provides early annunciation of the onset of a disturbance in a noisy environment and has user specifiable false-alarm and missed-alarm probabilities (see Gross et al. column 1 line 29-36), thereby suggesting the obviousness of the modification.

With regard to claim 44 the primary reference to Zhao et al. discloses a method for monitoring the operating condition of a system (see abstract) by acquiring a time-varying signal characterizing operation of the system (see column 3 line 29-47), periodically extracting observations of features from the time-varying signal (see column 4 line 44-47), generating estimates for at least one of the extracted features responsive to extracting an observation of

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features (see column 4 line 64-65), using a similarity operation with reference to a stored library of feature observations characteristic of acceptable operation of the system (see column 5 line 23-30), differencing at least one of the feature estimates with the extracted features to produce residuals for determination of deviating operating conditions of the system (see column 5 line 58-65). However, Zhao et al. fails to disclose the step of extracting features includes determining wavelet coefficients for the time-varying signal.

The secondary reference to Gross et al. discloses extracting a signal using generating a power spectral density function for the time-varying signal (see column 5 line 50-51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have specified Zhao et al. use a power spectral density function in extracting a signal.

Accordingly, such a modification would have been obvious since Gross et al. teaches using a power spectral density function to extract a signal renders the signal amenable to certain processing methods (see column 5 line 16-21), thereby suggesting the obviousness of the modification.

6. Claim 39 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,539,343 to Zhao et al. in view of U.S. Patent No. 6,731,990 to Carter et al.

With regard to claim 39 the primary reference to Zhao et al. discloses monitoring the operating condition of a system (see abstract) by a sensor means for acquiring a time-varying signal characterizing operation of the system (see column 3 line 29 through line 44), means for

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decomposing the time-varying signal into a plurality of components (see column 3 line 45 through line 67), it is inherent to Zhao et al. that a memory is used for storing reference snapshots – it is inherent because the disclosure speaks of collecting training data and constructing signal templates which cannot be done within a processing system as described without a memory for storing the data (see column 4 line 10 through line 29), the reference snapshots characterizing recognized states of the complex signal (see column 3 line 42 through line 44), it is inherent to Zhao et al. that a processor means is used – it is inherent because the disclosure speaks of comparisons and analysis that can only be accomplished in the processing system described by the use of a processing means (see column 4 line 1 through line 29), the processing means generating estimates of components using a similarity operation on the component values from the decomposing means with reference to component values in each reference snapshot in memory (see column 5 line 4 through line 12), generating residual values by differencing component values and estimates (see column 5 line 58 through line 60), for determining deviating operating conditions of the system (see column 5 line 62 through line 65), and generating estimates by comparison within an expected range (see column 5 line 23 through line 30). However, Zhao et al. fails to disclose the similarity operation determines similarity between snapshots of component values as a function of Euclidean distance of the snapshots.

The secondary reference to Carter et al. discloses a similarity operation of data using a function of Euclidean distance.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have specified Zhao et al. determine similarity using a function of Euclidean distance.

Accordingly, such a modification would have been obvious since Carter et al. teaches using a function of Euclidean distance is a suitable measure of similarity (see Carter et al. column 23 line 14), thereby suggesting the obviousness of the modification.

Allowable Subject Matter

7. Claims 19-22, and 29-34 allowed.

8. The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for the allowance of claims 19-22 is the inclusion of the method step of providing a reference library of representative sets of correlated values in selecting the sets by including a particular set of correlated values if the particular set includes a minimum or a maximum value of one of the correlated values, as compared to all like values in all the sets of correlated values. It is this step found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 29-34 is the inclusion of the method step of extracting information from a complex signal by comparing for similarity of signal components against a plurality of snapshots in a storage set of historical components by rendering a value for each pair of corresponding components as a function of the difference between the pair and as a function of the expected range of variation for the component. It is this step found in each of the claims, as it is claimed in the combination, that has not been found,

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taught or suggested by the prior art of record which makes these claims allowable over the prior art.

Response to Arguments

9. With regard to claims 1, 2, 3, and 6-10 and applicant's arguments filed 2/9/2004 in paragraph 2 on page 11 of paper 11 have been fully considered but they are not persuasive. It is clear from the specification of Zhao et al. that a comparison is done to determine similarity of signals and that this comparison must involve "an expected range" which is defined by the templates used in comparison (see column 5 line 23 through line 30). The templates themselves define the expected range since they are the standard against which an extracted signal is compared and must define an upper and lower limit, or range, to allow for comparison and therefore Zhao et al. reads fully on the limitations of the claim language of claims 1, 2, 3, and 6-10.

10. With regard to claims 11-13 and applicant's arguments filed 2/9/2004 in paragraphs 3 and 4 on page 11 of paper 11 have been fully considered but they are not persuasive. It is clear from the specification of Zhao et al. that a processor does "generate estimates of the components using a similarity operation" (see column 5 line 4 through line 12). The examiner appreciates the arguments of applicant on line 5 of paragraph 3 of page 11 of paper no. 11, however the examiner must examine the claims using the ordinary meaning of the words in the broadest reasonable interpretation. [[While the claims of issued patents are interpreted in light of the specification, prosecution history, prior art and other claims, this is not the mode of claim

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interpretation to be applied during examination. During examination, the claims must be interpreted as broadly as their terms reasonably allow. The USPTO uses a different standard for construing claims than that used by district courts; during examination the USPTO must give claims their broadest reasonable interpretation. This means that the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification.]] (SEE MPEP 2111) Further, the templates themselves define the expected range since they are the standard against which an extracted signal is compared and must define an upper and lower limit, or range, to allow for comparison and therefore Zhao et al. reads fully on the limitations of the claim language of claims 11-13.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony T. Dougherty whose telephone number is (571) 272-2273. The examiner can normally be reached on Monday through Friday from 8 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


atd


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